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# Reduction in Social Media Usage Produces Improvements in Physical Health and Wellbeing: An RCT

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## Abstract

Social media usage has increased over recent years and has been associated with negative effects on health and wellbeing. This study explored whether reducing smartphone screentime would improve health and wellbeing. Fifty students completed a battery of questionnaires regarding their health, immune function, loneliness, sleep, anxiety, and depression. They were allocated randomly to groups either using smartphones as normal (No Change), reducing usage by 15 min per day (Reduce), or reducing use by 15 min and substituting another activity during this time (Reduce + Activity). After 3 months, they completed the same questionnaires again. There was unexpectedly low compliance with the Reduce + Activity (leisure substitution) intervention. In contrast, there was a significant reduction in screentime for the Reduce group compared to the other two groups. There was a significant improvement in the Reduce group in general health, immune function, loneliness, and depression compared to the other groups. These findings extend previous results from similar studies and suggest limiting screentime may be beneficial to health and wellbeing.

**Keywords** Social media usage reduction · Health · Wellbeing

Humans rely on social interactions for healthy mental and physical functioning (Bloomberg et al., 1994). Mobile phones and social networking sites (SNS) are a convenient way of maintaining such contact, often replacing face-to-face interactions (Nyland, 2007). "Post-Millennials," born from 1997 onwards, are among the highest users of SNS, with White et al. (2010) finding 20-year-old university students used their phone for an average of 7.5 h a day, with such usage predominantly being for applications such as Instagram and Snapchat (Lenhart et al., 2016).

SNS usage is associated with a range of effects on wellbeing (Kushlev & Leitao, 2020), including negative impacts on emotion regulation (Hoffner & Lee, 2015), depression, anxiety, and stress (Augner & Hacker, 2012), as well as negative effects on sleep quality and length (Buboltz et al., 2009; White et al., 2010). There is also evidence that high levels of usage of digital technology are associated with poor health and immune funtion (Reed et al., 2015). The negative impacts on health are suggested to result, in part, from replacement of physical activities by SNS usage (Brown et al., 2002; Kushlev & Leitao, 2020; Montag & Elhai, 2020; Reed et al., 2015). García-Hermoso and Marina (2017) found teenagers with higher phone screentime not only received lower school grades but also reduced their involvement with sports and other extracurricular activities. For example, Kushlev and Leitao (2020) propose three mechanisms of SNS influence: firstly, their usage replaces other activities (*displacement*); secondly, their usage interferes with concurrent activities (*interference*); but thirdly, their usage may allow access to information and activities that otherwise unavailable (*complementarity*). Similarly, Montag and Elhai (2020) argue that SNS usage may indirectly reduce wellbeing by reducing levels of activities important for health and wellbeing, especially in children, such as rough and tumble play, and time spent outside, as well as leading to worsened mood (increased low mood) due to parental neglect, as a consequence of adult usage.

Despite there being correlational evidence for a negative relationship between SNS screentime and health and wellbeing, it is unclear whether SNS screentime causes these negative effects, or whether the poor health and wellbeing were already present, but fuel SNS use (see Kushlev & Leitao, 2020). There is limited data that could be used to address this issue, largely due to the obvious difficulties in conducting an experiment manipulating SNS use, and those data

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there are in existence show some contradictory findings (see Kross et al., 2021, for a review).

Hunt et al. (2018) noted that a group of participants limited to 10 min per platform per day, for 3 weeks, reported improved wellbeing, and reduced loneliness and depression. This study moved the evidence beyond the correlational to suggest use of social media was associated with worse mental health. Hunt et al. (2021) compared a group asked to limit social media usage to 30 min per day in total, with groups asked to limit usage to 30 min per day and increase their active use, or to continue social media use as usual. After 3 weeks, depressed participants in the limited use group showed reduced depression, compared to depressed participants the control group and in the active group. Similarly, Allcott et al. (2020) noted that paying participants to deactivate Facebook for four weeks increased offline activities, and increased subjective wellbeing.

In contrast, Przybylski et al. (2021) found that, when comparing participants on days in which they had their usual use with days on which they were abstinent from social media, abstaining did not improve wellbeing; participants reported similar wellbeing on days when they did and did not use social media. Similarly, van Wezel et al. (2021) compared week-long 50% and 10% reductions in social media use and noted little difference between the groups in wellbeing. Although they found that participants in both groups reported decreased negative emotions, they found no increase in positive emotions.

One feature that may explain the differences in these findings is the length of abstinence, with the longer-term studies (e.g., Hunt et al., 2018, 2021) reporting greater improvements than studies using shortened timeframes (e.g.,Przybylski et al., 2021; van Wezel et al., 2021). In fact, Hall et al. (2019) found that reducing social media use can have multiple effects on wellbeing. Participants were randomly assigned to no change, abstinence from social media for 1 week, 2 weeks, 3 weeks, or 4 weeks groups. Participants use of social media was negatively associated with quality of life. However, abstinence from social media also increased time spent engaged in other activities, which were sometimes associated with worse affective (such as cleaning). It may be that with greater time to adapt to the "free time," and to make more positive use of that time for themselves, reduced social media use would tend to have more beneficial effects.

Given the relative lack of experimental evidence relating to this area, and the conflicting nature of some of the findings, the current study further explored the effects of reducing social media usage, requiring a SNS reduction of 15 min per day for the "reduction" condition. Although a small reduction, this is broadly in line with that used previously (Hunt et al., 2018), and was felt to be achievable for participants. In addition to a "no change" and a "reduction" condition, a third condition was also included in this current study, which required participants to reduce their SNS use by 15 min per day, and directly instructed them to participate in another leisure activity of their choice during this period. This manipulation has not been explored in the context of social media usage but has been found to be effective in reducing problem gambling (Jackson et al., 2013). It is unclear whether the direct instruction would have the same beneficial impact on social media users. It may counteract the tendency to fill the "free time" with activities that are nonpreferred and could be implicated as potentially beneficial approach for wellbeing through the suggestions of Kushlev and Leitao (2020) and Montag and Elhai (2020). Alternatively, this manipulation may be counterproductive to give direct instructions (rather than leaving this to them) about doing something else when they would otherwise engage in social media. Finally, the current study extended the range of measures taken, focusing on health and health-related quality of life, as well as mental and social wellbeing. Changes in participants' functioning, across multiple domains, were assessed over a three-month period. These areas of functioning included health-related quality-of-life, depression, anxiety, sleep, loneliness, as well as social media addition scores.

## Methods

### Participants

Participants were recruited through advertisements posted online across six universities in the UK (prior to the lockdown restrictions imposed for COVID, when the study was also conducted). They were required to be between 18 and 30 years old, with an SNS application on their smartphone, such as Snapchat, Instagram, Facebook, or Twitter, and a method of recording screentime, such as being able to activate it in "Settings," or download the "YourHour" application. G-Power calculations suggested that for a large effect size ($f^2(V) = 0.14$), using a $p < 0.05$ criterion, for 80%, that 78 participants would be needed for a multivariate analysis of variance (MANOVA) with three groups and five response variables (see below). Originally, 74 participants were approached, but 4 declined to take part. None of the remaining 70 participants dropped out during the study, but 17 failed to complete the questionnaires, with a further 3 were removed as they were not able to provide their phone screentime (given the attrition, 67% power was achieved, and participant numbers were in line with previous studies; Hunt et al., 2018, 2021). Participants were not financially rewarded, nor did they receive course credit.

Of the remaining 50 participants (33 female, 17 male), all were undergraduate students at 6 different universities in the UK. The mean age was 23.48 (+3.52; range = 19 – 30) years. The participants were allocated into one of three groups by the use of a random number generator, which resulted in 16 participants in the "No Change" group (23 originally allocated), 17 in the "Reduce" group (27 originally allocated), and 17 in the "Reduce + Activity" group (24 originally allocated). The Department of Psychology Ethics Committee at the University approved the research.

## Materials

*Social Media Addiction Scale – Student Form* (SMAS; Şahin, 2018) measures social media addiction for a university population, using 29 items, each scored on a 5-point Likert scale ("strongly agree" to "strongly disagree"). The total score ranges between 29 and 145, with higher scores indicating more dependency on social media. The internal reliability for this sample (Cronbach $\alpha$) was 0.82 at baseline and 0.86 at follow-up.

*The Short Form (36) Health Survey* (SF-36; Ware & Sherbourne, 1992) gauges overall physical and mental health status, and consists of 36 questions. There are 8 scales assessing vitality, physical functioning, general health perception, bodily pain, mental health, and physical, emotional, and social role functioning. Role functioning concerns the respondent's perceptions of any negative impacts of physical, emotional, or social issues on limiting the activities which they perceive to be important to them. Scores range from 0 to 100 in each scale, with higher scores reflecting lower disability. The internal reliability for this sample at baseline was $\alpha = 0.78$, and at follow up it was $\alpha = 0.80$.

*Immune Function Questionnaire* (IFQ; Reed et al., 2015) is a 15-item measure assessing immune function quality. The IFQ analyses 19 symptoms, such as a common cold, influenza, cold sores and skin infections, each on a 5-point Likert scale ("never" to "frequently"). Total scores range from 0 to 79, with higher scores reflecting a poorer immune function. The internal reliability from this sample at baseline was $\alpha = 0.83$, and at follow up was $\alpha = 0.84$.

*UCLA Loneliness Scale* (UCLA; Russell et al., 1978) measures feelings of loneliness and social isolation. It includes 20-items, scored on a 4-point scale ("Often feel this way" to "Never feel this way"). The total score ranges from 20 to 80, with higher scores reflecting worse loneliness. The scale had an internal reliability for this sample at baseline of $\alpha = 0.95$, and $\alpha = 0.96$ at follow-up.

*Pittsburgh Sleep Quality Index* (PSQI; Buysse et al., 1989) is a 19-item measure of sleep length and quality, with each item answered on a 4-point Likert scale ("not during the past month" to "three or more times a week"). Total scores range between 0 and 21, with higher scores reflecting poorer sleep quality. The internal reliability from this sample at baseline was $\alpha = 0.64$, and at follow up it was $\alpha = 0.65$.

*Hospital Anxiety and Depression Scale* (HADS; Zigmond & Snaith, 1983) measures anxiety and depression symptoms: 7 items measuring anxiety, and 7 items measuring depression. Each item is scored 0 to 3, with a total score for each scale of 21. The questionnaire had an internal reliability of $\alpha = 0.84$ at baseline, and 0.81 at follow up, for anxiety; and $\alpha = 0.91$ at baseline, and 0.83 at follow up, for depression.

*SNS screentime:* Participants were asked to email screenshots of their SNS usage from the past week, each week, throughout the study period. Most participants owned an iPhone, so their average weekly screentime could easily be found in their "Settings" application. Owners of other smartphones were asked to download an application called "YourHour" to record their screentime.

## Procedure

Once participants had agreed to take part, they were sent a link to a website ("Gorilla"), on which they were able to complete this study. Firstly, participants were presented with an information sheet explaining the study. If they consented, they were presented with the above questionnaires. They were then informed how to record their SNS use over the past week, using Screen Time in phone settings, or how to download the "YourHour" application (see Velasco-Llorente & Sañudo, 2020, for previous use of this app in a similar context) for smartphone devices which did not already have this feature. Participants were asked to send a screenshot of their SNS screentime for the last week to the experimenter each week.

Participants were informed of their group allocation: "No Change," "Reduction" (decrease SNS use by 15 min per day), or "Reduction + Activity" (decrease SNS use by 15 min per day, and participate in another leisure activity, with suggestions, such as reading and exercise given, and prohibitions placed on anything related to computing, including using this for, or to access, entertainment). This information was sent in an e-mail to all participants prior to their commencement of the study. The participants were not informed of the existence of other possible conditions by the experimenters. The e-mail sent to the participants in the "No Change" group was based on that reported by Hunt et al. (2018) and read: "Please complete the attached set of questionnaires, and send a screenshot of your screentime, as measured by YourHours, today. Please do this every week when you receive the reminder e-mails. Please use social media as usual until you receive the next e-mail." The e-mail sent to the "Reduction" group read: "Please complete the attached set of questionnaires, and send a screenshot of your screentime, as measured by YourHours, today. Please do this every week when you receive the reminder e-mails. Please try to reduce your use of social media from its current level by 15 min, and continue at this lower usage each day until you receive the next e-mail." The e-mail sent to the "Reduction + Activity" group read: "Please complete the attached set of questionnaires, and send a screenshot of your screentime, as measured by YourHours, today. Please do this every week when you receive the reminder e-mails. Please try to reduce your use of social media from its current level by 15 min, and continue at this lower usage each day until you receive the next e-mail. In place of this social media use, you may like to participate in another activity during these

15 min, such as reading or exercising, but do not substitute in something related to computing, including using computers for entertainment." A week later, all participants were contacted to remind them to send screenshots of their SNS screentime over the previous 7 days. Furthermore, the Group Reduce + Activity was asked what activities they had performed in the extra 15 min.

These steps were repeated every week for 3 months. After 3 months, participants were asked to complete the same questionnaires as at baseline. Following the completion of these measures, they were presented with a debrief sheet, which explained the study in more detail.

## Results

The means and standard deviations on all functioning domains for the three groups at the start of the study are displayed in Table 1. None of the group differences between these domains, when tested with an analysis of variance (ANOVA), were significantly different, all $ps > 0.10$.

Figure 1 shows the group mean screentime per day for each of the three groups, for the week prior to the study, for each month, and for the final week of the study. Inspection of these data shows that screentime fell for the "Reduce" group in the first month, and remained low. However, screentime remained largely constant for the "No Change" and "Reduce + Activity" groups. The top panel of Table 2 shows the group-mean (standard deviation) for minutes of social media activity per day, for the week prior to the experiment commencing, and for the final week of the experiment. Inspection of the change in time spent on social media (top panel) reveals there was little change in usage for the "No Change" group (a mean increase of 7 min per day). The "Reduce" group reduced usage by 37 min a day, but the "Reduce + Activity" group had a 25 min a day increase in social media usage. A one-way ANOVA conducted on these data revealed a statistically significant difference between the groups, $F(2,47) = 3.37$, $p = 0.043$, $\eta^2_p = 0.125$. Tukey's honestly significant difference (HSD) tests revealed significant pairwise differences between all three groups, $ps < 0.05$. In addition, the change in screentime for each group was tested against 0, using a paired $t$-test. This revealed no significant change in screentime use for the "No Change" group, $t < 1$, $d = 0.075$, or for the "Reduce + Activity" group, $t(16) = 1.48$, $p = 0.157$, $d = 0.135$. However, there was a significant reduction for the "Reduction" group, $t(16) = 3.56$, $p < 0.001$, $d = 1.414$.

**Table 1** Mean (standard deviation) at baseline for all measures for the three groups

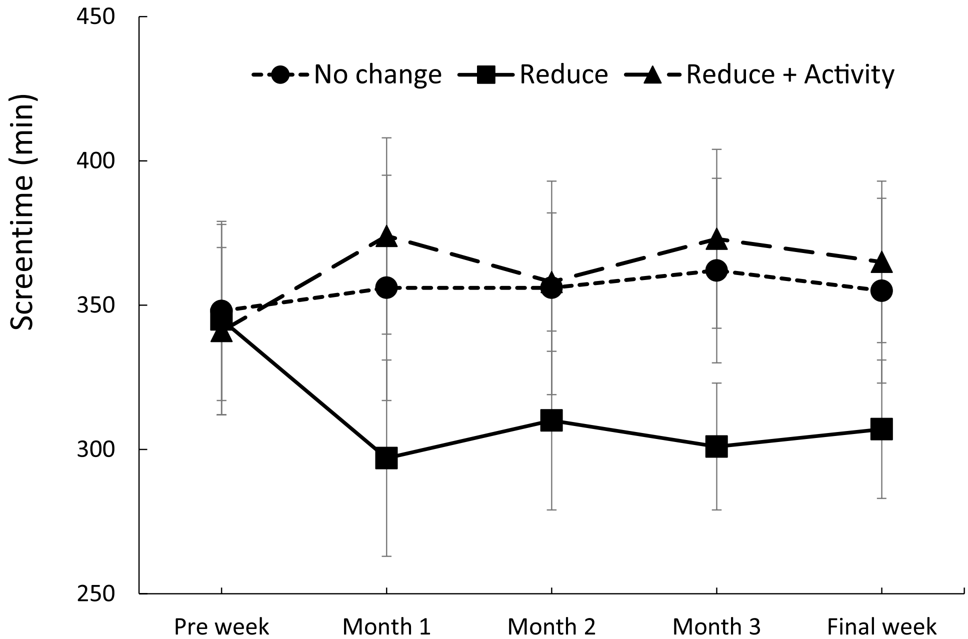
| | No Change | Reduce | Reduce + Activity |
|---|---|---|---|
| Age | 25.00 (4.510) | 22.41 (2.21) | 23.12 (3.20) |
| Screentime (min) | 348.25 (57.71) | 345.30 (64.62) | 351.40 (56.02) |
| SMA | 66.50 (15.51) | 66.59 (13.62) | 69.88 (14.25) |
| SF Physical | 91.88 (16.11) | 85.88 (22.02) | 88.23 (22.91) |
| SF Physical Role | 92.19 (17.60) | 83.82 (19.64) | 80.88 (32.15) |
| SF Emotional Role | 64.58 (42.98) | 74.51 (36.38) | 82.35 (26.66) |
| SF Fatigue | 52.93 (14.24) | 44.51 (17.79) | 48.81 (14.71) |
| SF Emotional | 70.00 (17.62) | 70.11 (17.55) | 68.23 (19.10) |
| SF Social | 72.18 (17.31) | 64.44 (22.76) | 68.38 (23.84) |
| SF Pain | 86.71 (17.83) | 80.88 (18.36) | 78.82 (22.88) |
| SF General Health | 61.15 (15.94) | 54.41 (19.60) | 53.25 (14.57) |
| IFQ Immune | 36.31 (8.70) | 37.00 (9.49) | 36.47 (8.55) |
| UCLA Loneliness | 17.75 (12.43) | 17.35 (10.29) | 19.82 (8.84) |
| PSQI Sleep | 6.75 (3.00) | 7.70 (2.56) | 7.88 (2.71) |
| HADS Anxiety | 18.75 (2.38) | 18.88 (2.75) | 17.17 (2.15) |
| HADS Depression | 15.93 (1.69) | 15.64 (1.22) | 15.52 (1.28) |

The bottom panel of Table 2 shows the group mean (standard deviation) social media addiction scale score prior to, and after, the experiment. Inspection of the change in social media addiction scores reveals little change over the experiment for the "No Change," or the "Reduce + Activity," groups. There was a reduction for the "Reduce" group. An ANOVA revealed a significant difference between the groups in change in screentime, $F(2,47) = 3.37$, $p = 0.031$, $\eta^2_p = 0.137$. Tukey's HSD tests revealed significant pairwise differences in the change in screentime between the "Reduce" group and both of the other two groups, $ps < 0.05$, but not between the "No Change" and "Reduce + Activity" groups, $p > 0.05$.

The change in social media addiction for each group was tested against 0, using a paired $t$-test. This revealed no significant change in SMA for the "No Change" group, $t < 1$, $d = 0.109$, or for the "Reduce + Activity" group, $t(16) = 1.82$, $p = 0.087$, $d = 0.441$. However, there was a significant reduction for the "Reduction" group, $t(16) = 3.52$, $p < 0.001$, $d = 1.403$. Correlations were conducted between the change in screentime (month 3 minus month 1) and changes in the other variable measured. Only the correlation between change in screentime and change in social media addiction was significant, $r = 0.305$, $p = 0.031$, all other correlations were small ($r < 0.30$) and nonsignificant ($p > 0.10$).

Figure 2 shows group mean change scores for each of the SF-36 scales (positive numbers indicating improvement). The "Reduce" group tended to show greater improvements than the other two groups, but this was especially so for restrictions to physical roles, and for general health. A multivariate analysis of variance (MANOVA) was conducted, using the change scores as the dependent variables, and revealed a significant difference between the groups, *Pillai's trace* $= 0.513$, $F(8,40) = 5.26$, $p = 0.044$, $\eta^2_p = 0.260$.

**Fig. 1** Group mean screentime scores for the week before the study, each month of the study, and for the final week, for each of the SF-36 scales. A positive number means an improvement in the score. Error bars = 95% confidence intervals




Univariate ANOVAs conducted on the individual scales of SF-36, revealed significant group differences for: role restrictions (physical), $F(2,47) = 3.19$, $p = 0.050$, $\eta^2_p = 0.120$, and general health, $F(2,47) = 4.51$, $p = 0.016$, $\eta^2_p = 0.161$. For both of these scales, Tukey's HSD tests revealed significant pairwise differences between the "Reduce" group and both of the other two groups, $ps < 0.05$, but not between the "No Change" and "Reduce + Activity" groups, $p > 0.05$. There were no significant group differences for: physical functioning, $F(2,47) = 1.01$, $p > 0.30$, $\eta^2_p = 0.041$; role restrictions (emotional), $F(2,47) = 2.66$, $p = 0.081$, $\eta^2_p = 0.102$; fatigue, $F(2,47) = 2.05$, $p = 0.142$, $\eta^2_p = 0.080$; social, $F(2,47) = 1.63$, $p = 0.208$, $\eta^2_p = 0.065$; pain, $F < 1$, $\eta^2_p = 0.029$.

The change in quality-of-life domains for each group were tested against 0, using a paired *t*-test. This revealed only a significant increase in fatigue for the "No Change" group, $t(15) = 2.96$, $p = 0.010$, $d = 0.739$. There was a significant improvement only for general health for the "Reduce + Activity" group, $t(16) = 2.38$, $p = 0.030$, $d = 0.578$. However, there were significant improvements for the "Reduction" group in emotional role, $t(16) = 2.95$, $p = 0.009$, $d = 0.716$; social role, $t(16) = 2.25$, $p = 0.039$, $d = 0.546$; fatigue, $t(16) = 3.17$, $p = 0.006$, $d = 0.768$; emotional role, $t(16) = 3.51$, $p = 0.003$, $d = 0.8456$ and general health, $t(16) = 4.55$, $p < 0.001$, $d = 1.105$. No other comparisons were significant.

Figure 3 shows the group mean change scores for immune functioning, loneliness, sleep quality, anxiety, and depression (a decrease in the value indicated an improvement). Inspection of these data reveals that the "Reduce" group showed greater improvements in immune function, sleep, and depression, than the other two groups. A MANOVA with change scores as the dependent variables, revealed a significant difference between the groups, *Pillai's trace* = 0.490, $F(10,88) = 2.86$, $p = 0.004$, $\eta^2_p = 0.245$. Univariate ANOVAs revealed significant group differences for: immune function, $F(2,47) = 4.39$, $p = 0.018$, $\eta^2_p = 0.157$ (Tukey's HSD pairwise difference between "Reduce" and 'No Change' groups, $p < 0.05$, only); loneliness, $F(2,47) = 3.60$, $p = 0.035$,

**Table 2** Group mean (standard deviation) for the three groups. Top panel = minutes of social media activity per day for week prior to experiment, and for the 3 months of the experiment. Bottom panel = social media addiction scale score for the three groups prior to and after the experiment

| | Social media time | | |
|---|---|---|---|
| | Pre | Post | Change |
| No Change | 348.25 (57.71) | 355.36 (59.74) | 7.12 (9.39) |
| Reduce | 345.99 (64.62) | 307.94 (46.74) | − 37.31 (43.21) |
| Reduce + Activity | 341.40 (56.01) | 365.13 (53.88) | 23.74 (65.96) |
| | Social media addiction | | |
| | Pre | Post | Change |
| No Change | 66.50 (15.51) | 65.50 (19.61) | − 1.00 (9.14) |
| Reduce | 66.58 (13.52) | 57.64 (11.42) | − 9.00 (10.53) |
| Reduce + Activity | 69.88 (14.36) | 67.08 (15.93) | − 2.82 (6.39) |

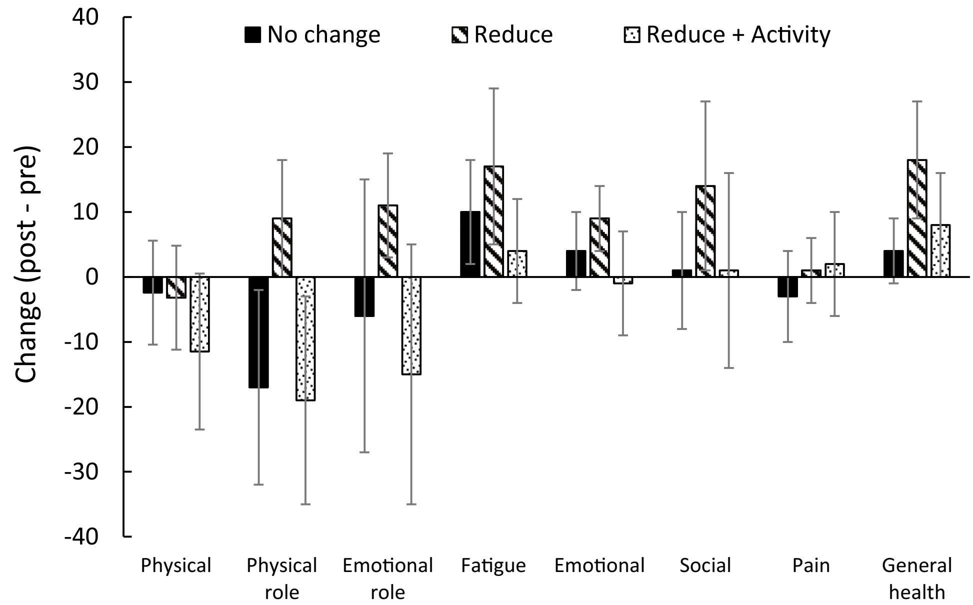



**Fig. 2** Group mean change scores, for all three groups, for each of the SF-36 scales. A positive number means an improvement in the score. Error bars = 95% confidence intervals

$\eta^2_p = 0.133$ (Tukey's HSD significant difference between 'Reduce' and 'No Change' groups, $p < 0.05$, only); and depression, $F(2,47) = 6.61$, $p < 0.001$, $\eta^2_p = 0.288$ (Tukey's HSD significant differences between 'Reduce' and both of the other two groups, $ps < 0.05$). There were no significant group differences for: sleep, $F < 1$, $\eta^2_p = 0.024$; or anxiety, $F(2,47) = 1.93$, $p = 0.156$, $\eta^2_p = 0.076$.

The change in these variables for each group were tested against 0, using a paired t-test. This revealed no significant changes for the "No Change" or "Reduce + Activity" groups. However, there were significant improvements for the "Reduction" group in: immune function, $t(16) = 4.17$, $p < 0.001$, $d = 1.102$; depression, $t(16) = 4.05$, $p < 0.001$, $d = 0.981$; and loneliness, $t(16) = 3.81$, $p = 0.002$, $d = 0.924$. No other comparisons were significant.

## Discussion

The current study aimed to explore previous findings examining the relationship between reducing social media use and wellbeing that have produced mixed results (cf. Allcott et al., 2020; Hunt et al., 2018, 2021; Kushlev & Leitao, 2020; Przybylski et al., 2021; van Wezel et al., 2021). The current study included a much greater range of health-related quality-of-life measures, and assessed immune functioning, to extend the range of

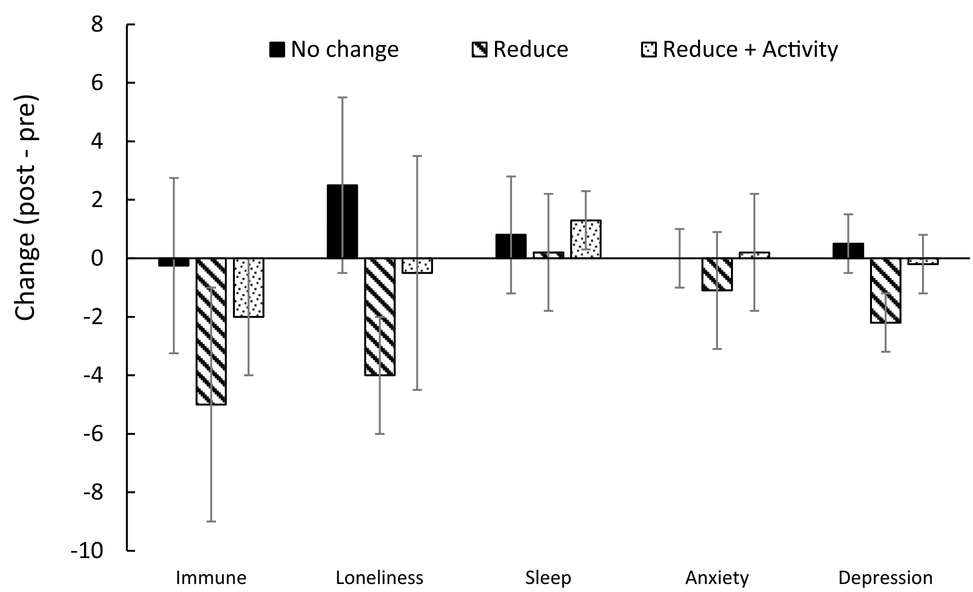



**Fig. 3** Group mean change scores, for all three groups, for the change in immune functioning, loneliness, sleep quality, anxiety, and depression. A negative number means an improvement in the score. Error bars = 95% confidence intervals

findings. It further examined whether a "leisure substitution" manipulation (Jackson et al., 2013), previously employed for gambling behavior, would be effective in the context of social media reduction, as there was some suggestion that previous time used for social media can be redeployed to less favored activities (Hall et al., 2019). The current results demonstrated that, over a three-month period, relative to a group which did not change social media usage, a group reducing social media activity by 15 min a day reported less social media dependence, and improved general health and immune functioning, as well as reduced feelings of loneliness and depression. These findings replicated those previously reported in studies using prolonged periods of reduced activity (Hunt et al., 2018, 2021), and extended these to health-related measures. However, there was no effect of the leisure-substitution manipulation, which, if anything, increased usage of social media.

That reduced social media usage resulted in improvements in wellbeing also substantiates a large literature of cross-sectional studies demonstrating associations between these variables (e.g., Augner & Hacker, 2012; Buboltz et al., 2009; García-Hermoso & Marina, 2017; Hoffner & Lee, 2015; White et al., 2010). The current report has an advantage in showing an experimentally-controlled relationship between reduced social media activity and improved wellbeing, rather than a correlational relationship, adding to the suggestion of a causal connection (see also Allcott et al., 2020; Hunt et al., 2018, 2021).

The present manipulation also improved health-related quality-of-life and immune function, which is a novel finding. This benefit of reduced social media corroborates suggestions made by Brown et al. (2002), and by Reed et al. (2015), regarding the negative impact of social media use on health. However, it remains to be established whether the relationship between social media use and health factors is direct, or whether it is mediated by changes in wellbeing variables (such as depression; see Hunt et al., 2021), or by other factors such as physical activity (Brown et al., 2002).

That the previous reports of Przybylski et al. (2021) and van Wezel et al. (2021) were not replicated is more than probably due to the very short length of time over which those latter studies required a reduction in social media usage. One reason why this may be important is suggested by Hall et al. (2019), and this may involve the time previously allocated to social media being used for less preferred activities (like cleaning), when no adaptations have had the chance to occur in participant behavior. In this regard, it is unclear why the leisure substitution manipulation had no effect in the context of social media reduction. In previous explorartions of this manipulation related to gambling, a behavior with close ties of social media dependency, such a manipulation has been effective (Jackson et al., 2013). Clearly, in the current context, the manipulation failed to work in that the group subject to the substitition actually increased usage of social media. This finding of noncompliance by participants would explain the failure of this group to improve their wellbeing and health scores, but does not explain why the use of social media increased. One possibility is that the manipulation of suggesting activities was relatively weak, and a stronger intervention to reinforce these activities would be beneficial. Alternatively, being directly instructed to so something may have developed a degree of countercontrol in the participants, who went against the intervention, and would explain the increase in social media activity.

The lack of compliance will need further examination, as it has some practical significance in this context. Examination of this group suggests a very wide range of effect on screentime change − 80 to + 183 min, with 8/17 (47%) of participants showing a reduction, and 9/17 (53%) showing an increase. The change in screentime was not predicted by any baseline variable inclusing age and gender. Future studies could ask what activities were substituted, as a number of studies that have done this have reported the wellbeing beneficial activities do tend to be substituted, at least when not asked directly to substitute (Olson et al., 2022). However, on the basis of the current findings, the clinical necesity of such a manipulation is questionable, as the simple request to reduce use appeared to be effective in this study, and in the previous experiments by Hunt et al. (2018, 2021).

It should be noted that the achieved power in this study was on the low side, which means the results should be treated with some caution. However, the current sample size after attrition effects did lead to an achieved power of 70%, which is not catastropghicallky low. Also, the sample size is in line woth previous studies (see Hunt et al., 2018, 2021). While future studies could address this aspect, the difficulties of recruiting participants, and mainatining them in a study such as this should not be underestimated. While the inclusion of a wide range of variables can be regarded as a strong feature for this exploratory study, it may introduce potential for error rates inflation in the statistical tests—somewhat mitigated by the use of MANOVA.

In summary, the findings from the current study replicated findings from similar previous studies, and suggested limiting screentime may be beneficial to health and wellbeing.

## Declarations

**Informed Consent** All participants gave informed consent for the study.

**Conflict of Interest** The authors declare no competing interests.

## References

Allcott, H., Braghieri, L., Eichmeyer, S., & Gentzkow, M. (2020). The welfare effects of social media. *American Economic Review, 110*(3), 629–676.

Augner, C., & Hacker, G. W. (2012). Associations between problematic mobile phone use and psychological parameters in young adults. *International Journal of Public Health, 57*(2), 437–441.

Bloomberg, L., Meyers, J., & Braverman, M. T. (1994). The importance of social interaction: A new perspective on social epidemiology, social risk factors, and health. *Health Education Quarterly, 21*(4), 447–463.

Brown, F. C., Buboltz, W. C., & Soper, B. (2002). Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. *Behavioural Medicine, 28*(1), 33–38.

Buboltz, W., Soper, B., Woller, K. M., Johnson, P., & Faes, T. (2009). Sleep habits and patterns of college students: An expanded study. *Journal of College Counseling, 12*(2), 113–124.

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213.

García-Hermoso, A., & Marina, R. (2017). Relationship of weight status, physical activity and screen time with academic achievement in adolescents. *Obesity Research & Clinical Practice, 11*(1), 44–50.

Hall, J. A., Johnson, R. M., & Ross, E. M. (2019). Where does the time go? An experimental test of what social media displaces and displaced activities' associations with affective well-being and quality of day. *New Media & Society, 21*(3), 674–692.

Hoffner, C. A., & Lee, S. (2015). Mobile phone use, emotion regulation, and well-being. *Cyberpsychology, Behaviour and Social Networking, 18*(7), 411–416.

Hunt, M. G., All, K., Burns, B., & Li, K. (2021). Too much of a good thing: Who we follow, what we do, and how much time we spend on social media affects well-being. *Journal of Social and Clinical Psychology, 40*(1), 46–68.

Hunt, M. G., Young, J., Marx, R., & Lipson, C. (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology, 37*(10), 751–768.

Jackson, A. C., Francis, K. L., Byrne, G., & Christensen, D. R. (2013). Leisure substitution and problem gambling: Report of a proof of concept group intervention. *International Journal of Mental Health and Addiction, 11*(1), 64–74.

Kushlev, K., & Leitao, M. R. (2020). The effects of smartphones on well-being: Theoretical integration and research agenda. *Current Opinion in Psychology, 36*, 77–82.

Kross, E., Verduyn, P., Sheppes, G., Costello, C. K., Jonides, J., & Ybarra, O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Sciences, 25*(1), 55–66.

Lenhart, A., Kantor, L., Malato, D., Benz, J., Tompson, T., & Zeng, W. (2016). Instagram and Snapchat are Most popular social networks for teens; black teens are most active on social media, Messaging Apps. Chicago, US.

Montag, C., & Elhai, J. D. (2020). Discussing digital technology overuse in children and adolescents during the COVID-19 pandemic and beyond: On the importance of considering Affective Neuroscience Theory. *Addictive Behavior Reports, 12*, 100313.

Nyland, R. S. (2007). *The gratification niches of Internet social networking, e-mail, and face-to-face communication*. Brigham Young University.

Olson, J. A., Sandra, D. A., Chmoulevitch, D., et al. (2022). A nudge-based intervention to reduce problematic smartphone use: Randomised Controlled Trial. *International Journal of Mental Health Addiction*. https://doi.org/10.1007/s11469-022-00826-w

Przybylski, A. K., Nguyen, T. V. T., Law, W., & Weinstein, N. (2021). Does taking a short break from social media have a positive effect on well-being? Evidence from three preregistered field experiments. *Journal of Technology in Behavioral Science, 6*(3), 507–514.

Reed, P., Vile, R., Osborne, L. A., Romano, M., & Truzoli, R. (2015). Problematic internetusage and immune function. *PloS One*, *10*(8).

Russell, D., Peplau, L. A., & Ferguson, M. L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment, 42*(3), 290–294.

Sahin, C. (2018). Social Media Addiction Scale-Student Form: The Reliability and Validity Study. *Turkish Online Journal of Educational Technology-TOJET, 17*(1), 169–182.

van Wezel, M. M., Abrahamse, E. L., & Abeele, M. M. V. (2021). Does a 7-day restriction on the use of social media improve cognitive functioning and emotional well-being? Results from a randomized controlled trial. *Addictive Behaviors Reports, 14*, 100365.

Velasco-Llorente, L., & Sañudo, B. (2020). The impact of Smartphone use on body composition, physical fitness, quality of life and selective attention on office workers. A pilot study. In *International Conference on Technology in Physical Activity and Sport* (pp. 33–42). Springer, Cham.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual framework and item selection. *Medical Care*, *30*(6), 473–483.

White, A., Buboltz, W., & Igou, F. (2010). Mobile phone use and sleep quality and length in college students. *International Journal of Humanities and Social Science, 1*(18), 51–58.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370.

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